Of Particles and Humans.
The question of 'human being' in Alexander Wendt's *Quantum Mind and Social Science*

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Abstract. Drawing on quantum theory, Alexander Wendt's *Quantum Mind and Social Science* suggests a thought-provoking reorientation of the social sciences. Addressing some of the key assumptions in Wendt's account, this article argues that despite a quite elaborate and eloquent development of a monist ontological position, conceptual discussions remain solely focussed on the nature of beings and neglect wider implications for the nature of being, particularly human being, that arise out of its abandonment of a substance ontology. To develop such a critique, I will first address some preliminary considerations about the broader assumptions underlying Wendt's argument. Secondly, the article zooms in on the central concern arising out of Wendt's approach regarding the conceptualisation of human being before raising a set of critical remarks which need further deliberation if a quantum approach to the social sciences is to be successful.

Keywords: ontology, consciousness, reflexivity, ontological difference

Big leaps in the conceptualisation and understanding of IR are rare. We can list seminal contributions (mostly only recognised retrospectively as such) at critical junctures within the discipline but overall these 'revolutionary', rather than 'evolutionary', contributions are few and far between. Additionally, even those often seen as 'revolutionary' in their contribution to the study of international relations are not unanimously recognised as such, not least due to the growing and accelerating diversification of (meta-)theoretical positions within IR.[1] In many ways, Wendt's contribution arrives at a time when meta-theoretical debates are back on the agenda within the discipline of IR.[2] Of course, matters concerning fundamental

[1] Peter Marcus Kristensen, 'Discipline admonished: On International Relations fragmentations and the disciplinary politics of stock taking', *European Journal of International Relations*, 22, no. 2 (2016), 12.
[2] See for instance the contributions by Patrick Jackson, *The Conduct of Inquiry in International Relations. Philosophy of science and it implications for the study of world politics* (London: Routledge, 2011) or Rudra Sil and Peter Katzenstein, *Beyond Paradigms. Analytic Eclecticism and the Study of World Politics* (New York: Palgrave MacMillan, 2010).

questions on epistemology, ontology and methodology in IR have in one way or another always been present at various stages of the disciplinary history. Equally present were voices that urged caution in getting bogged down in 'philosophical' debates, losing sight of the 'real' issues IR should be concerned with.[3] These voices, though, have been more consistently challenged over the last two decades or so. A substantive literature has emerged (and continues to emerge) that concerns itself with the very foundations, conceptual and theoretical, on which IR research is or should be based. Wendt himself, of course, has contributed to this literature in earlier work, not least with the introduction of scientific realism into the theoretical landscape of IR.[4] This growing reflection about the diverging, contested and competing meta-theoretical foundations of IR is for some, this author included, a welcome development; for others it is the very expression of a deep seated crisis of the discipline (and maybe even the social sciences more widely).[5] Wendt's newest contribution aligns with the latter view as it accepts the centrality of meta-theoretical scholarship but challenges the diversity of current meta-theorising as a sign of conceptual and theoretical stasis or 'land of confusion'[6].

Consequently, in *Quantum Mind and Social Science* Wendt does not just offer a competing approach to those currently used. Instead he seeks to replace the meta-theoretical diversity which he sees as a clear indication of an inability in the social sciences generally, and IR in particular, to provide a systematic framework able to address and resolve long-standing conflicts and disagreements about central puzzles connected to studying the social world. This is indeed a tall order and the result is a book which is as far-reaching in its discussion of these unresolved issues as it is revolutionary in its proposal to base any study of social circumstances on insights derived from quantum physics.

In response to protracted and seemingly unresolvable debates surrounding the relation between matter and ideas, body and mind, agents and structures, Wendt suggests a radical

[3] Famously expressed by William Wallace, 'Truth and Power, Monks and Technocrats: Theory and Practice in International Relations', *Review of International Studies* 22, no. 3 (1996), 301-321.

[4] Alexander Wendt, *Social Theory of International Politics* (Cambridge: Cambridge University Press, 1999).

[5] See for instance Josef Lapid, 'The Third Debate: On the Prospect of International Theory in a Post-Positivist Era', *International Studies Quarterly*, 33, no. 3 (1989), 235-254; Margaret G. Hermann, 'One Field, Many Perspectives: Building the Foundations for Dialogue', *International Studies Quarterly*, 42, no. 4 (1998), 605-624 or David Lake, 'Why 'isms' Are Evil: Theory, Epistemology, and Academic Sects as Impediments to Understanding and Progress', *International Studies Quarterly*, 55, no. 2 (2011), 465-480.

[6] Alexander Wendt, *Quantum Mind and Social Science. Unifying physical and social ontology* (Cambridge: Cambridge University Press, 2015), 1.

break with the most fundamental assumption these diverging approaches share, 'namely that social life is governed by the laws of classical physics.'[7] Instead Wendt argues for a turn towards quantum theory and a move to a new ontology that endorses a neutral monism coupled with a panpsychic vitalism. Drawing on a wide range of research in quantum theory, Wendt develops a detailed account of how a radical shift away from a meta-theoretical framework rooted in classical physics and its inherent ontological dualism, offers new avenues for social research in the same way as it has revolutionised the natural sciences. The brave claim underpinning such a move is that 'human beings and therefore social life exhibit quantum coherence – in effect, that we are walking wave functions.'[8] Wendt proceeds to underpin this claim by delivering a radical reinterpretation of key concepts, particularly focussing on the nature and role of consciousness, experience, will, cognition and language before presenting a brief re-reading of the agent-structure debate and the nature of the state at the end of the volume.

This article aims at raising some challenges to this proposed framework and its attempt to unify physical and social ontology. As will emerge, I am broadly sympathetic to the ontological claims made but at the same time I have reservations towards some of the key objectives and assumptions inherent in this approach.

Given the scope and ambition of the project as a whole, any critical engagement in article format will necessarily have to restrict itself to a set of particular claims rather than hoping to be comprehensive in its assessment. It is worthwhile starting by outlining avenues of critique and discussion that this article will not address. First, this article will not address the extent to which quantum theory has been portrayed and used accurately, simply because this author is not trained in quantum theory and any venture into discussions about competing interpretations would be pretentious at best and horribly banal at worst. Additionally, Wendt is quite clear and explicit about the rather tentative status of many interpretations in quantum theory.[9] Given the contested status of competing interpretations currently present, developing a critique of the path Wendt has taken would simply lead to an alternative reading of quantum theory, and risk bypassing the actual focus on the social sciences.

[7] Ibid., 2.
[8] Ibid., 3, 154.
[9] Ibid., 2 and 70-89.

Secondly, Wendt links many of his theoretical and conceptual insights and suggestions to existing literature in philosophy, sociology and social and political theory.[10] While a comparative study of the conceptual and theoretical complementarity of this research to the suggestions and analogies provided here could prove fruitful in establishing interdisciplinary links, the focus of this article will be more fundamental still (and in some ways less ambitious). It will be centrally concerned with the basic premise inherent in Wendt's book, that humans are walking wave functions, and the claim that a quantum approach to the social sciences provides a major breakthrough in our understanding of the social world.

To this end, the article proceeds in two steps. First, I will address some preliminary considerations about the broader assumptions underlying Wendt's argument (e.g. the path-dependency of his argument, the assumptions that we should or need to seek a unified ontology and some methodological implications of the suggested turn towards quantum physics). Secondly, the article zooms in on the central concern arising out of Wendt's approach regarding the conceptualisation of human being before raising a set of critical remarks which need further deliberation if a quantum approach to the social sciences is to be successful. In particular, this article will engage with the rather ambiguous state of human existence inherent in a quantum approach as suggested by Wendt. Portraying humans as 'walking wave functions' on the one hand leaves humans as one among many entities. Indeed, at times Wendt appears to equate human life with the 'life' of particles, leading to the possibility to formulate wave functions for human beings in basically the same manner as for particles. On the other hand, however, Wendt seems hesitant to push this physicalist congruence between humans and particles, acknowledging that humans are not only much more complex systems but also 'special' in that their brains can maintain a state of quantum coherence leading to considerable differences between human life and particle life.[11]

This article argues that in his account of human being and the hesitantly presented congruence between humans and particles, Wendt fails to adequately engage with one of the key challenges arising out of his proposed unified monist ontology which not only fundamentally redefines the nature of various *beings* (i.e. particles, humans etc) but also abandons the very notion of *being* (i.e. way in which existence as such is understood)

[10] Ibid., 110, 269, 163.
[11] Ibid., 124.

underwriting classical physics. This ontological difference (i.e. the difference between beings and being) remains neglected and obscured throughout his account. The consequence of this neglect is that Wendt fundamentally shifts the ground away from classic physics in his conceptual descriptions. At the same time, however, he remains wedded to a substance ontology in the very manner classical physics does. For large parts, the book in its descriptions of a quantum theoretical basis for the social sciences remains solely focussed on the nature of beings and neglects wider implications for the nature of being that arise out of its endorsement of a unified monist ontology – an oversight that leaves central questions concerning the manner and possibility of studying human behaviour from a quantum perspective open to ambiguity.

Preliminary considerations

The scope of *Quantum Mind and Social Science* opens Wendt's account up to many avenues of discussion and critique, so the first step is to engage with some of those preliminarily before focussing on the core concern discussed in this article. On the broadest level, using quantum theory to contribute to the study of the social sciences or even IR in particular is not altogether new.[12] We have seen research, as Wendt himself acknowledges, that links insights from a quantum approach in the various 'hard' sciences to issues and conceptions usually situated within the humanities or social sciences.[13]

Wendt, however, starts with a strong (philosophically) realist claim when he says that he intends the argument of human beings as wave functions 'not as an analogy or metaphor, but as a realist claim about what people really are […] my personal belief is that human beings really are quantum systems.'[14] While analogies between assumptions of the social sciences and insights derived from quantum theory have been made quite frequently, such a *realist* claim requires a particularly solid defence. Wendt undoubtedly demonstrates close and wide-ranging familiarity with research across various sciences drawing on quantum theory, but at

[12] In IR see for instance James Der Derian, 'From War 2.0 to quantum war: the superpositionality of global violence', *Australian Journal of International Affairs* 67, no. 5 (2013), 570-585.

[13] See for instance Gordon Globus, 'Bohr, Heidegger, the Unspeakable and Dis-closure: An Exercise in Quantum Neurophilosophy', *NeuroQuantology* 11, no. 2 (2013), 171-180; Patrick A. Heelan, 'Phenomenology, Ontology, and Quantum Physics', *Found Sci* 18, no. 2 (2013), 379-385; Hans Siegfried, 'Autonomy and Quantum Physics: Nietzsche, Heidegger, and Heisenberg', *Philosophy of Science* 57, no. 4 (1990), 619-630.

[14] Wendt, *Quantum Mind*, 3.

the same time the trajectory of his argument seems somewhat path-dependent. He openly admits that there are numerous, and indeed sometimes diametrically opposed, interpretations of quantum theory.[15] At every junction of his journey he informs the reader about the tentative nature of existing research, of possible alternatives that may lead in a completely different direction. Admitting to this volatility and yet pressing forward with a realist claim regarding the nature of human beings and social life more generally, however, seems somewhat odd. In some ways, the argument presented here seems the wrong way around. Wendt postulates the goal and then navigates his way through competing interpretations of quantum theory, picking the path compatible with his overall argument in order to arrive at his destination. Providing analogies and metaphors in this manner seems permissible but placing a realist claim on such a path-dependent reading places an undue burden on the tentative state of quantum theory. It is not that Wendt conceals alternatives or overplays the conclusiveness of the interpretations that he follows. He duly acknowledges the volatility of his choices; but this makes his commitment to a strong realist claim appear more rather than less problematic. I do not want to push this point any further here as any proper evaluation of the plausibility of Wendt's trajectory would require specialist knowledge concerning quantum theory, which, I admit, I do not have – however, whether *any* realist argument can be defended on such tentative grounds seems highly questionable.

The second preliminary consideration concerns his objective to unify physical and social ontology by introducing a quantum theory inspired approach to the social sciences. As Wendt argues, the taken for granted assumptions of classical physics on the one hand and the related 'mystery' of how mind can develop out of matter on the other have caused long-standing confusion. For Wendt, however, the issue here lies not primarily with conceptual, theoretical or empirical shortcomings of particular solutions to the mind-body problem but rather with the more fundamental reliance on the assumptions of classical physics.[16] Quantum physics offers an alternative approach that promises a decisive shift at the very basis of these debates by supporting a (neutral) monist ontology which allows mind and matter to be seen as aspects of an ontologically more fundamental level. 'Rather than accept the duality of aspects as a

[15] Ibid., 70-89.
[16] Ibid., 2

brute fact, neutral monists seek to explain the *emergence of the distinction* between the two aspects out of an underlying sub-stratum that is neither mind nor matter.'[17] If Wendt is successful we will arrive at an ontology in which all kinds of entities – from particles to humans – can be studied and explained within one unified ontological framework. It points, however, also to a deeper shift in the ontological setup; Wendt's monist ontology, as a deliberate move against (post-) Cartesian dualism, dispenses with a particular notion of ontology that is based on the ontological primacy of determinable substances. Instead, the sub-stratum he refers to, of which mind and matter are aspects, is not an actual substance but quantum coherence.[18] Consequently, the move away from a dualist ontology to an ontological monism does not just require a different understanding of the characteristics of substances (beings) but also a more fundamental rethinking of the notion of being as such – in other words Wendt's project raises questions of philosophical ontology, not 'just' scientific ontology.[19]

Two issues arise at this point: first, can quantum theory deliver such a framework – this question comes back to the ways in which quantum theory has been interpreted and which interpretations, if any, are sufficiently robust to support this new ontology. The second issue, which is of greater interest to us here, concerns the fundamental shift implicit in Wendt away from a substance ontology, in which the ontological difference between beings and being is concealed. A monist ontology as it is proposed here re-opens the need to engage with the question of being as distinct from questions about beings exactly because the ontological primacy is no longer ascribed to substances – Wendt abandons the metaphysics of presence upheld by classical physics and thereby necessitates deeper reflections on the concept of 'ontology' as such – reflections, however, his account barely delivers.

For large parts of the book, Wendt's treatment of the potential of quantum physics for the social sciences remains firmly situated in the scientific ontological realm, the realm concerned with delineating which entities exist and what characteristics they have. Beings, not being, is the focus of his deliberations. He accepts that there are qualitative differences between different entities (particles, rocks, plants, humans etc)[20] but proposes a shared

[17] Ibid., 126 (emphasis in original)
[18] Ibid., 132, 144.
[19] On this distinction and its relevance for the social sciences see for instance Jackson, *Conduct of Inquiry*, 28
[20] Wendt, *Quantum Mind*, 116-123.

ontology across the physical and social realm. This focus, however, relies upon a very specific understanding of 'ontology', still occupied with a concern about entities and their defining characteristics – an understanding that also structures the classical physics he seeks to leave behind and comes at the expense of equally crucial considerations concerning the nature of *being* resulting from having shifted the ground away from a substance ontology.

This shift, however, is a crucial consequence of the proposed monist ontological position and is not particular to Wendt's reflections on quantum theory either. Niels Bohr already raised the question of what quantum reality 'is', what lies beyond the substances we study scientifically (though he thought it unanswerable).[21] Wendt on rare occasions seems to allude to such deeper questions, for instance when he distinguishes between 'universal' and 'social' ontologies[22], yet he never penetrates the realm in which questions of being and their consequences for his approach are raised – a possibly costly neglect.

Even if we accept that human beings, as one of the entities he considers, may in their 'physicality' be subject to the same laws, their form of being may well require further meta-physical consideration (something Wendt is generally not opposed to[23]) if we aim for an explanation or understanding of their behaviour. In other words, within Wendt's quantum ontology, the question that should at least be considered is whether human *being* (not human *beings*) is qualitatively the same as other forms of being (i.e. is the form of existence of particles the same as the form of existence of humans) and if not, what follows for the study of human beings in a quantum approach. Wendt himself in his frequent references to the phenomenological tradition[24] provides one avenue to explore those questions.

The question of human being in a quantum approach

The role and nature of consciousness has provided the impetus behind much of phenomenological thought and equally provides one way to open such reflections on being rather than beings in Wendt's account. While Wendt discusses consciousness in order to

[21] See, for instance, Globus, 172; see also Arkady Plotnitsky, *The Knowable and the Unknowable. Modern Science, Nonclassical Thought, and the 'Two Cultures'* (Ann Arbor: University of Michigan Press, 2002).
[22] Wendt, *Quantum Mind*, 150.
[23] Ibid., 109.
[24] Ibid., 19, 84-85.

ground his panpsychic vitalism ontologically[25], further questions can be raised regarding his treatment of consciousness (and particularly his lack of reflection of self-consciousness) in relation to the study of social contexts. Despite Wendt's commitment to a monist and contextually situated account in which potentialities rather than efficient causal chains characterise human behaviour[26], he leaves two core concerns unaddressed: the affirmation of the ontological primacy of consciousness and considerations regarding the hermeneutic nature of human being and its impact on formulating and collapsing the wave function.

Regarding the first point, consciousness for Wendt is 'the subjective manifestation of wave function collapse in the moment'[27]; it emerges at the moment the wave function collapses and one of the potential realities becomes enacted or 'present'[28] in the same way as particles do not exist in any actual sense until an observation takes place. As Wendt himself suggests, consciousness and with it the actualization of a situated subject is manifest at the moment the wave function collapses – it is exactly not given essentially from the beginning. Further, the context in which and against which this subject emerges is also not ontologically given but co-emergent with the subject when the wave function collapses. As Wendt points out: 'As superpositions social structures are only potentialities rather than actualities, but this is equally the case for agents. Their superposed states are co-emergent, and if they become real realities they do so together in localized practices, which themselves are emergent from the dynamic process of wave function collapse.'[29] As a result, the actuality of human experience, if understood as a collapse of the wave function, does not establish an efficiently casual chain of 'events' between given entities, but rather the involved realisation of one out of many potentialities.[30] Ontologically, this also raises central questions about the status of the human subject and consciousness as they only appear factically at the moment of the collapse of the wave function.

The key here is that Wendt himself implies that consciousness as experience cannot be ontologically primary as it only emerges as an actuality with the collapse of the wave function. The question that arises then is how to grasp ontologically the pre-collapsed state of an

[25] Ibid., 144.
[26] Ibid., 188.
[27] Ibid., 139.
[28] Heelan, 'Phenomenology, Ontology and Quantum Physics', 380.
[29] Wendt, *Quantum Mind*, 265.
[30] Ibid., 188.

unobserved wave function – a question pertaining to the form of being rather than the constitution of beings. Some quantum physicists have reflected upon this quantum reality and thought it to be beyond conceptualisation. 'According to Bohr, quantum reality defaults all distinctions, all objectuality.'[31] Quantum reality, exactly because it precedes the collapse of the wave function, is ontologically more fundamental than the emergence or either consciousness or subject – it pertains to existence or, in other words, being.[32] Bohr himself, as Wendt correctly points out[33], of course refused to address ontological questions about what quantum reality 'is', yet questions concerning its effects in manifesting forms of being can be raised and addressed.[34]

However, Wendt's quantum solution to the mind-body problem and the related invocation of subjectivity and consciousness as part of an panpsychic vitalism which imbues matter with mind, has too quickly glossed over these deeper questions concerning philosophical ontology and the related particularities of human being and its relation to the world. To be fair, Wendt does provide some references to these deeper ontological questions, not only, as shown above, when he sees social structures and human agents as co-emergent but also when he observes: 'For if there is one place in nature where time and causality seem to work backwards it is in human action, with its strongly teleological quality. Thus, while from an external, material perspective our behaviour seems 'pushed' by the interactions of matter in the past, from an internal, phenomenological perspective it feels more like we are 'pulled' by reasons advanced into – indeed in a sense from – the future.'[35] 'Being pulled by reasons advanced into the future', however, already points towards a very particular way in which human being relates to its world which warrants further scrutiny.

On an individual level, i.e. the level concerning the characteristics of human beings, Wendt recognises unique characteristics, particularly the proposed ability of our brains to maintain a continued state of quantum coherence[36], a positon central to his claim that human subjects

[31] Globus, 'Bohr, Heidegger, the Unspeakable and Dis-closure', 172; see also Plotnitsky, *The Knowable and the Unknowable*.
[32] Ibid., 172.
[33] Wendt, *Quantum Mind*, 74.
[34] Globus, 'Bohr, Heidegger, the Unspeakable and Dis-closure', 172.
[35] Wendt, *Quantum Mind*, 129.
[36] Ibid., 124.

are basically walking wave functions.[37] Crucially, this ability, compared to other entities such as stones or plants, allows for a continuous sense of existence in which past, present and future coalesce.[38] This continuity across space and time provides for the possibility of a single coherent subject fusing mental and material aspects in the form of a panpsychic vitalism that overcomes the perennial mind-body dualism and its concomitant philosophical challenges.

When moving his arguments from the realm of particles to the social realm, Wendt subscribes to a form in individualism that underwrites his otherwise holist ontology. As he explains: 'Unlike the physicist's particles, which literally do come from nowhere, our elementary units are given at birth by nature, and as such impose a 'rump individualist' limit of a holist argument.'[39] Wendt's treatment of human subjects as compared to particles is somewhat ambiguous throughout, however. On a general level he is happy to state that 'in social life the 'particles' are biological individuals whose bodies cannot fuse even in principle'[40] and further that ''social life is not essentially different from that of sub-atomic particles'[41] Such commitments to an underlying consistency stretching across particles and human beings is of course not surprising given that his overall endeavour is to establish a unified physical and social ontology. Doing so requires entities to share fundamental characteristics and to be subjected to the same fundamental forces while recognising that the study of human behaviour necessarily creates a much more formidable challenge for the researcher. As walking waking wave functions, human individuals are entangled on a quantum level, normatively and linguistically.[42] This means that 'individual action' in the strictest sense is not possible; context and established social structures provide an inevitable framework in which and against which action must be understood. In the end, 'who we are at a given moment cannot be separated from our context. And given that our contexts are vastly more complex subtle and varied that those on physics, that means compared to sub-atomic particles our behaviour will be vastly more complex, subtle and varied as well.'[43] Nevertheless, Wendt remains confident that despite the increase in complexity wave functions can be formulated for human beings as they can for particles.

[37] Ibid., 154.
[38] Ibid., 120.
[39] Ibid., 150.
[40] Ibid., 257.
[41] Ibid., 131.
[42] Ibid., 172, 218-220.
[43] Ibid., 168.

A number of questions arise at this point though that lead beyond the account of the characteristics of human beings and pertain to the deeper form of being humans may exhibit. The ability of the human brain to maintain quantum coherence (if we follow this supposition) and the concomitant effect of creating a form of being which is no longer definable by its actual presence alone has a number of ramifications. For one, the ability to form and maintain a coherent identity throughout time imbues human being with a disposition of openness towards its own future. Human being assumes a sense of directionality which transcends the immediacy of the circumstances in which it finds itself. Equally, as a second consequence, the awareness of a particular past cannot be separated from the analysis of any particular present. Human being in its actuality is circumscribed by both its past actualities and its future possibilities. Most importantly, however, this contextual situatedness is accompanied by the emergence not only of consciousness but also self-consciousness, the ability to reflect upon the very conditions of existence and project a specific intended trajectory into a yet to be realised future. Finally, the continuity of human being across time, coupled with the concomitant situatedness and the ability of reflexively relating to its own existence also reveals a very particular relation between human being and the world it inhabits.

This form of being exhibits a qualitatively different characteristic from the being of particles, not only ontically (i.e. concerning human beings as qualitatively different entities compared to particles) but also, and more fundamentally, ontologically (i.e. exhibiting a different form of being). If 'the distinctive feature of … human life … is that … living human beings relate themselves interpretively to their lives, that they understand themselves in a continuous process of self-understanding, experience and re-interpretation'[44] then, as Wendt himself suggests, the past acquires its meaning in light of present experiences and anticipations while the meaning of the present and the anticipation of the future are conditioned by the way in which the past has been understood. As was alluded to above, Wendt has glimpses of this more fundamental dimension shining through some of his arguments, yet he fails to recognize its significance for his own undertaking. Recognising the particularity of the form of being that constitutes human existence, however, raises issues that are in need of clarification if a quantum account is to be successful in studying the social world.

[44] Georgia Warnke, *Gadamer. Hermeneutics, Tradition and Reason* (Cambridge Polity Press, 1987), 38.

The first issue concerns the primacy of consciousness in the newly developed quantum ontology. On the level of scientific ontology, which seeks to establish the entities that exist and their characteristics, the treatment of consciousness is central to Wendt's account. Yet, its primacy on the level of philosophical ontology is highly questionable. In moments where Wendt relates consciousness to the collapse of the wave function, the spectre of a more fundamental ontological shift away from a substance ontology shines through. If consciousness understood as experience is manifest in the collapse of wave functions, i.e. in the actualization of potentialities, then, ontologically speaking, consciousness is not primary but secondary – ontological primacy rather lies with the uncollapsed wave function and its inherent possibilities. This, however, also means that any ontological foregrounding of subjectivity and consciousness proposed in the book is unwarranted. Instead we would need to ask how to understand, ontologically, the existence of wave functions as pure agglomerations of potentialities – this, however, relates to questions of *being* rather than *beings*. This can be done by shifting our focus away from individual beings and enquire into the form of being that constitutes their existence. Doing so brings us to the notion of human being as a form of being which engages with the world self-reflexively and whose actualisations and in fact its processes of individuation are ontologically secondary. Wendt fails to develop this account of being sufficiently; his monist, quantum based ontology remains 'stuck' on a scientific ontological level dealing with substances while at the same time acknowledging that substances no longer have ontological primacy.

The second, concomitant question concerns the formulation of wave functions. If human being is inherently self-reflexive and relates interpretively to the world, the question arises as to how wave functions are actually derived. For Wendt, this does not seem a particular challenge when he states: 'That means that just as for the particle in the cloud chamber, an outside observer could in principle write a single equation to describe our behaviour.'[45] At the same time he recognises that the fusion of the third and first person perspective in the case of human beings opens the possibility of two positions from which any one wave function could be drawn up. If we were to write the wave function for 'Jones' we need to

[45] Wendt, *Quantum Mind*, 119.

acknowledge that 'even if Jones and Smith might write the same equation describing Jones' wave function in a given context – and to that extent have similar third-person knowledge about him – Jones has a privileged form of access to this equation from the inside.'[46]
Initially, one can see what makes Wendt think that Smith and Jones will actually write the same equation expressing Jones' wave function. His scientific ontological position inscribes basically parallels between all entities and hence the same basic physical constraints apply. Human beings may be more complex than particles but nevertheless can be subsumed under the same ontological framework. For Wendt they are walking wave functions and while they show temporal coherence and the ability to provide a first-person perspective (and are therefore qualitatively different entities compared to particles), their wave functions can be formulated. They resemble Leibnizian monads and their particular context and conditions for action can be described and hence their potentialities captured. He acknowledges that 'who we are at any given moment cannot be separated from our context'[47] and even goes so far as to claim that 'we cannot speak of a stable, objective reality'[48]. Yet, this contextualisation only means that the way we 'measure' influences the result – for particles as for humans. It does still leave open the possibility that knowing the context and way of measurement, we formulate a wave function (though there seem to be big question marks here as well[49]).

If we shift focus, however, to the underlying considerations about forms of being and not just characteristics of beings, questions arise. Compared to the wave function for particles, for instance, formulating potentialities to become actualized in the case of human beings requires a hermeneutic understanding; each human being relates interpretively to their world and the very meaning they inscribe to this world will inevitably impact on the formulation of the wave function. The interpretive layer which self-reflexivity affords human beings makes it seemingly impossible to reduce the potentialities to a single wave function – instead there will be as many wave functions for a human being a there will be interpretively relating beings discerning potentialities. Because Wendt does not engage with the deeper notion of being he is unable to properly address the hermeneutic nature of human being and, concomitantly,

[46] Ibid.
[47] Ibid., 168.
[48] Ibid.
[49] see for instance the tentative conclusions about the sub-conscious and emotions in quantum decision theory in Wendt, *Quantum Mind*, 167.

lacks a proper consideration of the effects of self-reflexivity in his account; he seems to posit a simple parallel between the delineation of a wave function for a particle and the delineation of a wave function for human beings. This is basically done on the basis that both are forms of matter imbued with mind. What seems to separate particles and humans for Wendt is the more complex form of consciousness that affords humans the ability to develop a coherent experience in time. This difference, however, moves beyond degrees of complexity of consciousness in that human beings exhibit a particular form of being that allows them – compared to particles – to relate interpretively to their world.

Given that this reflexivity is an ontological feature of human existence, human beings' aims and objectives, tasks and priorities change constantly in line with their hermeneutic form of existence. Furthermore, as the interpretive situatedness is a basic feature of human being, judging the potentialities and formulating the equation of the wave function will always be done from a situated perspective and no situated perspective is the same exactly because, as Wendt recognises, context is non-local, i.e. includes memories, experiences, projections and so on which individualise context and the meaning of the context for each human being. Whose equation about Jones is authoritative? His own because he has privileged access? But to what extent can we even speak of 'his own' given the multi-layered entanglement human beings are subject to?[50] We reach here the limits of Wendt's notion of subjectivity. Although we may be able to biologically discern material boundaries, the content of the subject's self is not private but public; it is exactly not the self-transparent consciousness that knows itself but the self-transcendent consciousness that underlines the always public construction of identity. The fundamentally situated and hermeneutic form of being human beings exhibit forecloses the possibility of any 'neutral' ground from which potentialities can be derived and translated into an equation expressing the wave function of an individual. There will be as many wave functions as there will be observers and no grounds to judge which is the 'correct' one since even the materialisation of an actual state of affairs from a potential one will in its meaning be socially negotiated and constructed; after all, it is commonplace in politics that 'events' (i.e. actualised potentialities) are inscribed with completely different, often diametrically opposed meanings.

[50] Ibid., 172, 218-220.

But even if we were able to formulate equations expressing the wave functions of individuals two further issues arise. First, how stable are wave functions of human beings? How often do we have to adjust the wave function to reflect the changing projections of individual human beings and incorporate the potentialities inherent in these projections? If we formulate such an equation of particles in controlled experimental setups, these wave functions will be very stable. If we do not change the manner of observation, results will be constant. Given all the above reflections on human being as a hermeneutic form of being, however, how can we assume the same for human beings (and that is even without raising the issue of translating the complexities and subtleties of human meaning into the straightjacket of mathematical symbolism)? The main challenge in formulating wave functions for human beings compared to particles seems to lie in the fact that human beings relate interpretively and self-consciously to their environment while particles do not. The relative stability we can achieve in formulating wave functions for particles seems jeopardised in the case of human beings. And if we can't assume such stability, how volatile, and subsequently how 'useful' will these equations be (independent of the wider epistemological question whether they would actually tell us everything we need to and want to know)?

As we can see, Wendt delivers a quite coherent, if tentative account, of a quantum social science as long as his reflections remain at the level of scientific ontology, i.e. re-descriptions of the qualities and characteristics of entities. Wider considerations, made implicitly necessary by his abandonment of a substance ontology, however, suggest necessary reflections on questions of being, and for the social sciences, particularly human being.

Final remarks

Overall, *Quantum Mind and Social Science* delivers a provocative contribution to the meta-theory of the social sciences. Wendt provides a wide-ranging, substantive and accessible account of how and why taking quantum theory seriously in social research can promise to provide new inputs into deadlocked debates. The sense in which it identifies the rootedness of competing accounts in an underlying commitment to the laws of classical physics provides an opening to fundamentally rethink social science ontologically by shifting ground towards and taking seriously cutting edge research in quantum science.

As we have seen, however, for all the eloquence in which the case for quantum social science is made, challenges remain. These are not only linked to the still raging debates within quantum theory about competing interpretation but also, and more specifically about the application of any interpretation of quantum theory to the social sciences, particularly if pushed on realist grounds. This article has focussed on Wendt's treatment of the key entity the social sciences are concerned with – human beings. Wendt's monist position and its explicit rejection of (post-)Cartesian dualism has opened ways to engage anew with the protracted mind-body problem putting forward a pan-psychic and vitalist argument that fundamentally changes the conception of the beings we study. At the same time, however, and hidden from view in Wendt's account, such a move abandons the notion of substance ontology in which the notion of being is collapsed in to the presence of beings. Developing a monist ontology in which substances (most centrally mind and matter) are no longer primary but aspects of a deeper ontological sub-stratum also provides the opportunity and the need to re-think our conception of ontology and ask anew questions pertaining to form of human being in a quantum account. Wendt does on rare occasions venture into deeper ontological questions but overall remains, contradictorily, stuck within a metaphysics of presence when focussing on the delineation of characteristics of existing beings without asking questions about their form of being, questions that his own approach raises.

This article has highlighted how asking these deeper questions can philosophically complement Wendt's account but equally, how their neglect raises questions regarding the practicalities of bringing a quantum approach to the social science.